Paper No. 33

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MONTE A. DOUGLAS
And RICHARD A. STOLTZ

Appeal No. 1998-2401
Application 08/286,106

ON BRIEF

Before PAK, WALTZ and PAWLIKOWSKI, Administrative Patent Judges.

PAWLIKOWSKI, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the decision of the examiner refusing to allow claims 1, 2, 4-7, and 10-19. Claims 3, 8, and 9 have been canceled.

THE INVENTION

Claims 1, 13, and 14 are representative of the invention and are reproduced below:

1. A method for masking a structure for patterning micron and submicron features, said method comprising:

a. forming at least one monolayer of adsorbed molecules on a partially completed integrated circuit structure;

b. prenucleating portions of said adsorbed layer by exposing said portions corresponding to a desired pattern of an energy source;

c. selectively forming build-up layers over said prenucleated portions to form a mask over said structure; and

d. etching said structure in areas not covered by said mask to form patterned features.

13. A method for masking and implanting a structure comprising:

a. forming at least one monolayer of adsorbed molecules on a partially completed integrated circuit structure;

b. prenucleating portions of said adsorbed layer by exposing said portions corresponding to a desired pattern of an energy source;

c. selectively forming build-up layers over said prenucleated portions to form a mask over said structure; and

d. implanting into portions of said structure not covered by said mask.

14. A method for masking and oxidizing a structure comprising:

a. forming at least one monolayer of adsorbed molecules on a partially completed integrated circuit structure;

b. prenucleating portions of said adsorbed layer by exposing said portions corresponding to a desired pattern of an energy source;

c. selectively forming build-up layers over said prenucleated portions to form a mask over said structure; and

d. oxidizing a surface of said structure not covered by said mask.

THE REFERENCES OF RECORD

The examiner relies upon by the following references:

Richman	4,282,647	Aug. 11, 1981
Tamamura et al.(Tamamura)	4,426,247	Jan. 17, 1984
Pitts	4,566,937	Jan. 28, 1986
Jelks et al. (Jelks)	4,612,085	Sep. 16, 1986
Ehrlich et al.(Ehrlich)	4,615,904	Oct. 7, 1986
Dooley et al.(Dooley)	4,897,150	Jan. 30, 1990

THE REJECTIONS

Claims 1, 4-7, 10-12 and 17-19 stand rejected under 35 U.S.C. § 103 as being obvious over the combination of Ehrlich and Jelks.

Claims 1, 5-7, 10-13 and 17-19 stand rejected under 35 U.S.C. § 103 as being obvious over the combination of Ehrlich and Tamamura.

Claim 2 stands rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Ehrlich and Jelks and further in view of Dooley.

Claims 13 and 14 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Ehrlich and Pitts.

Claims 13, 14, 15 and 16 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Ehrlich and Richman.

OPINION

We have carefully considered all of the arguments advanced by the appellants and the examiner, and we reverse each of the above-mentioned rejections.

We first note that the examiner has the initial burden of factually supporting any *prima facie* conclusion of obviousness. Ex parte Clapp, 227 USPQ 972, 973 (Bd. Pat. App.& Int. 1985). We further note that in order for a *prima facie* case of obviousness to be established, the teachings from the prior art itself must appear to have suggested the claimed subject matter

to one of ordinary skill in the art. See In re Rinehart, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976).

I. The 35 U.S.C. § 103 rejection of claims 1, 4-7, 10-12 and 17-19 over Ehrlich and Jelks

The examiner states that it would have been obvious to one having ordinary skill in the art to use the build-up layer pattern disclosed in Ehrlich, as an etch mask, because Jelks teaches that metal etch mask patterns can be formed by direct writing, and Ehrlich's method is one such direct writing method. (answer, page 4).

The examiner further states that it would have been obvious to have substituted Ehrlich's method of direct writing in the method of Jelks, and Ehrlich's method offers the advantages of maskless film growth (these advantages being that Ehrlich's method allows the separation of the delineation phase of the film formation from the growth phase, and, as a result, to use separate sources for production of the atom flux in the two phases). (answer, pages 4-5).

The examiner emphasizes that Ehrlich can be used in combination with Jelks for teaching another method of forming build-up layer etch masks. (answer, page 10). The examiner further emphasizes that Jelks and Ehrlich have in common the fact that they both form build-up layers. (answer, page 10).

In view of the above summary of the examiner's position, it appears to us that one of the examiner’s reasons for combining the references is the fact that each of Ehrlich and Jelks form build-up layers. We find that such reasoning is insufficient. That is, the mere fact that each reference (Ehrlich and Jelks) grows build-up layers does not imply that one of ordinary skill in the art would have been motivated to incorporate the method of building up a layer as set forth in Ehrlich into the process set forth in Jelks. Indeed, as pointed out by appellants on page 4 of their brief, Ehrlich is directed to a method for growing patterned films without masks. This begs the question of why one of ordinary skill in the art would have been motivated to use the method of Ehrlich (maskless) in Jelk's method (which involves use of masks).

We note that on page 11 of the answer, the examiner states that both Ehrlich's method and appellants' method form patterned thin films without the use of masks, and that there is no disclosure by Ehrlich that teaches that once the patterned thin films are formed, they cannot then be used as masks. Our comments follow.

We find that Ehrlich's disclosure is silent as to what steps, if any, specifically occur after the patterned films are formed. We note that Ehrlich is directed to maskless film growth of patterned films. See column 1, lines 14 and 15 and lines 55-59 of Ehrlich. We also note that Ehrlich discloses that the disclosed invention may be used (1) for metallization of integrated chip patterns and contacts for photovoltaic solar cells, (2) to deposit catalysts in patterns, and (3) to deposit dopants in patterns. See column 5, lines 26-36 of Ehrlich. However, this disclosure at column 5, lines 26-36 is silent as

to how the build-up layer of Ehrlich is utilized after it is formed. Ehrlich only indicates that the build-up layer results in a patterned film (see, e.g., claims 1 and 20).

Also, while the examiner states that there is a motivation to utilize the process of forming the build-up layers in Ehrlich in the process of Jelks based upon the fact that Ehrlich's method allows the separation of the delineation phase of the film formation from the growth phase, and, as a result, to use separate sources for production of the atom flux in the two phases (answer, pages 4-5), we find that the examiner has not explained why the process in Jelks would necessarily benefit from this aspect of Ehrlich's invention. That is, the examiner has not provided an explanation of why one of ordinary skill in the art would have been motivated to utilize the benefit of Ehrlich's invention regarding the ability to use separate sources for production of the atom flux in the two phases, in the method of Jelks.

Hence, like the appellants, we believe that the only guidance for so combining the applied reference teachings is based upon impermissible hindsight derived from appellants' own disclosure (W.L. Gore & Assocs. v. Garlock, Inc., 721 F.2d 1540, 1553, 220 USPQ 303, 312-313 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984)) rather than some teaching, suggestion or incentive derived from the prior art (ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir., 1984)).

Therefore, we reverse the rejection of claims 1, 4-7, 10-12, 17-19 under 35 U.S.C. § 103 as being unpatentable over the combination of Ehrlich and Jelks.

II. The rejection of claims 1, 5-7, 10-13, 17-19 under 35 U.S.C. § 103 over Ehrlich and Tamamura

The examiner states that it would have been obvious to use the build-up layer pattern as an etch mask in a method similar to Ehrlich's method, and to etch the structure in areas not covered by the build-up layer pattern, to form pattern features, because Tamamura teaches that it is known to use fine patterns of build-up layers, formed by prenucleation of a substrate with an energy beam, as etch masks. (answer, page 7).

With respect to claim 13, the examiner states that Tamamura teaches to use build-up layers as a mask in order to dope a substrate, and that therefore it would have been obvious to have used the pattern formed in the method of Ehrlich, as an implant mask because Tamamura teaches that it has been known to use build-up layers, formed by prenucleation of a substrate with an energy beam, as masks for implantation of a dopant. (answer, page 8).

Appellants reiterate that Ehrlich is directed to a method of forming metal lines using a maskless growth method, and that this teaching away renders the combination unobvious. (brief, page 5). Appellants also indicate that Tamamura is directed to a method of forming a graft polymer film on an irradiated pattern portion of a surface of a silicone layer overlying an organic polymeric material layer. (brief, page 6).

The examiner rebuts, on page 11 of the answer, that both Ehrlich and Tamamura form build-up layers. It therefore appears again that the examiner finds that this similarity among each of these references provides ample motivation to combine the

references in such a way that would have led one of ordinary skill in the art to incorporate the method of Ehrlich of forming build-up layers into the method of Tamamura, wherein Tamamura uses the build-up layers as etch masks or as a mask for doping.

However, we find the disparate teachings of each of these references (maskless method of Ehrlich involving photodissociation of an absorbed molecular monolayer versus Tamamura's etching of a silicone layer using a graft polymer pattern as a mask) lacks the requirement that some teaching, suggestion or incentive derived from the prior art supports the combination. ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d at 1577, 221 USPQ at 933.

Hence, we also reverse the rejection of claims 1, 5-7, 10-13, and 17-19 under 35 U.S.C. § 103 as being unpatentable over the combination of Ehrlich and Tamamura.

III. The rejection of claim 2 under 35 U.S.C. § 103 as being unpatentable over Ehrlich and Jelks as applied to claim 1 and further in view of Dooley

As mentioned supra, the applied art of Ehrlich and Jelks fails to provide a *prima facie* case of obviousness with respect to claim 1; hence, because Dooley does not cure the aforementioned

deficiencies of the combination of Ehrlich and Jelks, we reverse the rejection of claim 2.

IV. The rejection of claims 13 and 14 under 35 U.S.C. § 103 as being obvious over the combination of Ehrlich and Pitts

The examiner states that it would have been obvious to one of ordinary skill in the art to have used the build-up layers formed by Ehrlich as an implantation mask because Pitts teaches that build-up layers formed by dissociation of a gas under the action of an energy beam can be used as implantation masks. (answer, page 9). The examiner also states that it would have been obvious to one of ordinary skill in the art to have used the build-up layer formed by Ehrlich as an oxidation mask because oxidation masks are well known as taught by Pitts. (answer, page 9).

We find that Pitts does not utilize a monolayer of adsorbed molecules, as in the process of Ehrlich. Rather, substrate **30** is coated with a thin film **32** of aluminum metal. A rastered electron beam is applied to the surface of the substrate to deposit an enhanced film of oxide **34**. A reactive ion etch of the coated substrate removes the aluminum and exposes underlying substrate areas **38** and the exposed substrate areas **38** may be doped. See column 9, lines 7-25 of Pitts. See also Figures 5, 6 and 7 of Pitts. The examiner refers to column 2, lines 25-29 of Pitts for teaching that aluminum films have been used as oxidation masks. (answer, page 9). However, we find that the teachings of Pitts are in the context of coating a substrate with a thin film of aluminum metal, and do not involve the steps of forming a monolayer of adsorbed molecules, followed by

prenucleating portions of the adsorbed layer, followed by selectively forming
build-up layers over the prenucleated portions, as in the process of Ehrlich. The examiner has not provided a sufficient explanation of why one of ordinary skill in the art would have been motivated to use the film formed according to Ehrlich, as an etch mask or an oxidation mask according to the method recited appellants' claims, in view of these differences between the process of Ehrlich and the process of Pitts. The examiner also has not provided a sufficient explanation of why one of ordinary skill in the art would reasonably have expected that a film formed according to Ehrlich would be effective as an etch mask or an oxidation mask in view of the teachings of Pitts. In this context, we agree with appellants' statements made on page 6 of their brief. Hence, the examiner has not met his initial burden of factually supporting a *prima facie* conclusion of obviousness. Ex parte Clapp, 227 USPQ at 973 (Bd. Pat. App. & Int. 1985).

Therefore, we reverse the rejection of claims 13 and 14 under 35 U.S.C. § 103 as being obvious over the combination of Ehrlich and Pitts.

V. The rejection of claims 13-16 over Ehrlich and Richman

The examiner states that it would have been obvious to one of ordinary skill in the art to implant or oxidize a portion of the structure not covered by the metal mask in a method similar to Ehrlich because Richman teaches that metal masks have been used as implantation or oxidation masks. (answer, page 10). The examiner further states that the motivation to combine

Ehrlich and Richman is that Ehrlich and Richman both have metal patterns, and Richman is used as a teaching that it is useful to use a metal pattern as an oxidation or implantation mask. (answer, page 11). However, as mentioned above in connection with the secondary reference of Pitts, we find that the examiner utilizes the teachings of Richman whereby Richman involves masking in a different context, i.e., no monolayer of adsorbed molecules is involved; no prenucleating portions of the adsorbed layer are involved; and no selectively forming monolayers over the prenucleated portions is involved. In this context, we agree with appellants' statements made on page 8 of their brief. The examiner has not explained how, given the different process of Richman, that one of ordinary skill in the art would have a reasonable expectation of success of using the film formed according to Ehrlich's process, as an oxidation or implantation mask. Moreover, we find the disparate teachings of each of these references (maskless method of Ehrlich involving photodissociation of an absorbed molecular monolayer versus Richman's method including formation of an insulating layer and a conductive layer, followed by selective removal of portions of these layers) lacks the requirement that some teaching, suggestion or incentive derived from the prior art supports the combination. ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d at 1577, 221 USPQ at 933.

Hence, we reverse the rejection of claims 13-16 under 35 U.S.C. § 103 as being unpatentable over the combination of Ehrlich and Richman.

CONCLUSION

We reverse each of the art rejections of record.

REVERSED

Chung K. Pak Administrative Patent Judge	)
Thomas A. Waltz Administrative Patent Judge	) BOARD OF PATENT) APPEALS AND) INTERFERENCES
Beverly Pawlikowski Administrative Patent Judge	)

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